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ORIGINAL ARTICLE

Accident and vascular injury with stingray in the Alto Juruá, Acre, Brazil: a case report

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Manuscript received: September 2018
Manuscript accepted: August 2019
Version of record online: October 2019

Abstract

Introduction: Injuries caused by fish are common and considered a neglected health problem with high morbidity and low lethality. Noteworthy are the envenomings by freshwater stingrays, which are considered very serious and one of the most important injuries caused by aquatic animals in South America.

Case Presentation: To describe an accident and vascular injury with venomous stingray animals in the Alto do Juruá, Acre, Brazil. Male patient admitted due to stingray in the left lower extremity 20 days ago.

Conclusion: The freshwater stingray, due to its sharp characteristics, injured the great saphenous vein, requiring surgical intervention. The situation presented negative evolution due to the lack of necessary procedures in the first attendance, such as the proper cleaning of the wound and the removal of the sting.

Keywords: stingrays, occupational health, venomous animals, venomous fish.

Suggested citation: Holanda MN, Câmara OF, Silva DD, Bernarde PS, Silva AM, Lima MVM, et al. Accident and vascular injury with stingray in the Alto Juruá, Acre, Brazil: a case report. *J Hum Growth Dev. 2019; 29(3):427-432.* DOI: https://doi.org/10.7322/jhgd.v29.9542

Authors summary

Why was this study done?
The ichthyism are the accidents caused by marine or river fish, in Brazil these accidents are somewhat common, but still a little neglected by people and health services, most are not reported or treated correctly. Despite being common in Brazil, little is still discussed about its causes and effects on the population, generating accidents that could be preventable if there was sufficient knowledge. Stingrays are one of the main types of venomous fish, although not aggressive they cause a high number of accidents in the regions that are present. In Brazil, they are distributed by the rivers of the North, North, Midwest, South and Southeast

What did the researchers do and find?
A case report of a complication involving injury to the posterior region of the right leg was performed, evolving with vascular injury and hypovolemic shock 20 days after the sting, in a patient previously treated at the health unit on the day of the stingray accident, where no recommended treatments were performed, such as cleaning the wound and removing the sting containing poison.

What do these findings mean?
The fast and effective action in the clinical management of individuals affected by this type of venomous animal causes treatment success, with lower costs and reduced sequelae, generating direct effects on the improvement of quality of life.

INTRODUCTION

Fish accidents, called ictism, are common and considered a neglected health problem, with high morbidity and low lethality raising the possibility of underreporting due to the various weaknesses found. These can also occur by poisoning and trauma[1].

Traumatogenic accidents may occur from fish bites such as piranhas or from the electric shock discharge of some species (eg *Electrophorus electricus* and some marine stingrays)[1]. Passive poisoning occurs through the ingestion of poisonous fish such as pufferfish[1,2]. There are other fish that are venomous (eg stingrays, lionfish, rockfish) and can cause poisoning through stings[1,3].

Stingrays, in particular, also known as rays, are cartilaginous fish (*Chondrichthyes*) and are found in freshwater (rivers, lakes) as well as marine environments[4]. These are characterized by their flattened body dorsoventrally, with eyes located dorsally and the mouth and gill slits ventrally, and one or more retroserilla tail stingers surrounded by an integument containing toxin-secreting cells[5].

Freshwater stingrays, which belong to the family Potamotrygonidae, have different characteristics due to their historical process of adaptation to the environment. Poisoning by this type of stingray is considered very serious and one of the most important injuries caused by aquatic animals in South America[6]. Stingray accidents cause severe local pain, erythema, edema, ulceration and skin necrosis, and secondary infections and retention of sting fragments may occur in the wound[3].

Complications such as amputation of fingers, hands and feet may also occur[3,5]. Less frequent are fatal cases caused by freshwater and marine stingrays, resulting from immediate penetrating chest trauma or delayed cardiac tamponade, cervical lacerations with airway compromise, vascular injury with hemorrhagic shock, gangrene wound infections and septic shock[7].

Stingray ichthyism is considered a neglected health problem in Brazil[3] and the Amazon is the region with the highest number of accidents with these fish, where 88.4% of the notifications by Reckziegel *et al.*[8] were observed. In the Northern region, the literature has been reporting the available stingray poisoning, mainly referring to the states of Amapá[9] and Amazonas[5].

In Acre, Brazil, only Pierini *et al.*[10] reported a prevalence of 18% and 23% of riverine and rubber tappers interviewed during a study in Alto do Juruá, being considered a common type of accident in this region. Given the relative scarcity of literature on ichthyism in the western Brazilian Amazon, and considering that this region is potentially liable to affect these cases due to its location in the Amazon basin, we present here a case report of vascular injury caused by a stingray accident seen at the Juruá Regional Hospital in Cruzeiro do Sul, Acre, Brazil.

This study will report an accident and vascular injury with venomous stingray animals in the Alto do Juruá, Acre, Brazil.

CLINICAL SURGICAL CASE PRESENTATION

Brazilian male patient, 18 years old, brown, admitted to Juruá Regional Hospital due to stingray in left lower limb for 20 days, with pain in the affected limb, skin paleness, cold sweating, intense thirst and heavy bleeding in the sting area (Figure 1). Hemodynamically unstable, eupneic, afebrile, blood presure: 100x80mmHg, heart rate: 100bpm, respiratory rate: 22rpm and O^2 saturation of 98%. Earlier, in the first service performed about 20 days after the reported admission date (on the day of the accident), in the emergency room, the patient had bleeding and was released with painkillers to his residence.

In the second visit, venous hydration, analgesia and cephalotine antibiotic therapy were performed, and the General Surgeon's evaluation was requested. During the evaluation, the surgeon identified abundant bleeding from the stingray injury and suspected vascular injury, performed the examination request and referred it to the operating room for emergency surgery. Laboratory tests showed the following results: HB: 7.4%, HT: 19.5% Red blood cells: 2.36 million, Lactate: 27, ESR: 39mm, TAP: 32.3%, INR: 1.92, Leukocytes : 14,500, sticks: 7%.

During surgery, partial lesion of the right great saphenous vein was evidenced, with active bleeding at the area (Figure 2). It was chosen to perform ligation of the vein with 2.0 cotton thread, abundant wound cleaning, and closure by planes. The patient evolved uneventfully and was discharged from hospital on the 4th postoperative day.

Figure1: Bleeding from patient's stingray injury. Cruzeiro do Sul, Acre, Brazil, 2018

Figure2: Right saphenous vein partial lesion with active local bleeding. Cruzeiro do Sul, Acre, Brazil, 2018

DISCUSSION

Freshwater stingrays are potentially more lethal than marine stingrays, this is due to specifically biological factors, where the species of the family Potamotrygonidae have descendants of the same ancestor (monophyletics) that have unique characteristics, such as the median enlargement of their pelvis, blood with low concentration of urea and reduction of the rectal gland, these factors together make these stingrays more agile and with sharper reflexes for their defense[11].

Another associated factor can be explained in the histological study by Pedroso *et al*.[12], where the authors identified from the analysis of the sting of freshwater and saltwater stingrays, where freshwater stingrays have a higher amount of venomous proteins distributed in the epidermis of its stinger, and, in the marine, this amount is smaller and found only in or around isolated regions. Therefore, the immediate need for treatment after stingray sting in humans is evaluated, due to the lack of knowledge about the depth and the lesions caused by the sting, as well as the poisonous proteins that it emits, which may generate future infections in the patient.

Immediate treatment is basically based on immobilization of the limb affected by the sting, cleaning the lesion in order to remove residual venom from the stingray, after that, pain control with analgesics is made, tetanus vaccination is given and heating of the lesion area with a approximate temperature of 45ºC is made.

Subsequently, after first aid, more accurate analysis of the wound, performing a deep, if necessary, surgical cleaning to remove the sting and its fragments[2,13,14].

In the reported case, in the emergency care provided to the victim, only the initial hygiene was performed due to the present bleeding and pain control analgesia, releasing the patient afterwards.

Thus, it is assumed that the injury worsened during the subsequent 20 days due to the failure to complete the recommended therapeutic procedures, mainly due to the non-removal of the sting, considering its peculiar characteristics that could aggravate the patient's condition.

The medical team, in turn, needs to be able to deal with stingray ichthyism, as inadequate or insufficient treatment can contribute to late complications[2]. The importance of surgical exploration to check vascular lesions is noted[15], avoiding future complications such as a hemorrhagic shock.

Stingrays usually have one or two stingers, which are long in length, have an acute characteristic and are

replaced periodically. Its structure has grooves at various ends and jagged ridges (similar to a knife).

Therefore, depending on where the sting was inserted into the human being, the damage can be harmful and thus fatal. However, the stingrays defend themselves with a strong reflection of their tail, and attack the lower limbs, usually the ankle and foot regions, as distracted swimmers or fishermen end up stepping on these animals[16,17].

Regarding the patient studied, partial lesion of the great saphenous vein was observed, which originates in the first toe, passing anteriorly through the internal malleolus, rising up the inner side of the leg, reaching the knee and performing internal ramifications until it united with the femoral vein[18]. Therefore, it can be concluded that this lesion originated from the stingray sting which, due to its sharp characteristics, grooves and jagged ends, allied to the region in which the sting was performed, showed exposure of the great saphenous vein.

However, there is still discussion about the procedures that could have been performed in the first care of the post-accident victim, such as sting removal. The presence of the foreign body may have increased the lesion, which favored the need for a surgical procedure for its ligation.

Also noteworthy is the necrotic aspect of the wound, which worsened with the sting period. The formation of central necrosis is one of the expected clinical aggravations of the stingray sting, which later evolves to a sagging skin and a difficult to heal ulcerative process[19].

In relation to the epidemiological characteristics, the freshwater stingrays of the family Potamotrygonidae continue to be present mainly in the Amazon basin, Tocantins and with some migrations through the Paraná River.

The study by Reckziegel *et al*.[8] analyzed the accidents with aquatic animals that occurred in Brazil reported by SINAM (Sistema de Informação de Agravos de Notificação) from 2007 to 2013, observed that the majority of cases occur in the Amazon (66.2 % of 4118 records). These authors also observed that the main animal that causes accidents in the Amazon is the stingray, representing 92.2% of the 2317 accidents recorded for the region. The city of Rio Branco, capital of the state of Acre occupies the seventh position in Brazil.

Regarding the city of Cruzeiro do Sul, Acre, Brazil, residence of the patient studied, the authors presented less than 10 cases that occurred within seven years. However, the hypothesis of underreporting of cases is raised, which may be related to several factors, such as lack of access to information and home treatments performed by the riverside community.

In the study by Pierini *et al*.[10], although more than 20 years old, the authors interviewed riverine and indigenous people in Alto do Juruá to study the prevalence of accidents with venomous animals, noting that accidents with stingrays are common among them. There were 214 riverine residents (representing 18% of the 1181 respondents) and 169 indigenous (representing 23% of the 739 respondents) who had suffered stingray accidents in Alto do Juruá.

Accidents with freshwater stingrays are less frequent, but when they occur they are more severe than those of marine water. This fact was present in the studied patient, because due to the characteristics of the sting (with differences of the marine stingray), it injured the great saphenous vein requiring surgical intervention. However, it is believed that the picture presented a negative evolution due to the lack of necessary procedures in the first attendance, such as adequate wound cleaning and sting removal.

The need for better preparation of health teams in these cases is emphasized, especially in the surrounding regions of the Amazon basin, as it have large amounts of stingrays in the family *Potamotrygonidae.*

Due to the heavy rainfall in the winter season and the surface waters in the Alto do Juruá region in the summer period and the existence of large numbers of venomous animals with the habitat in these waters that are frequented by local and regional residents, mainly fishermen and bathers, there is an increase in the frequency of human venomous stingray accidents every year in the western Amazon region.

It is necessary to provide the stimulus for Environmental Education in contemporary society, focusing on the environmental scenario, as a proposal to assist in the construction of a dignified social structure for all, aiming to organize transformative human actions with the environment, to obtain better quality of life for everyone, with holistic vision in an integrated world.

As Environmental Education is a process of dynamic, permanent and participatory formation, which inserts man into transformations in his daily life, in this matter, starts to live with venomous animals in harmony, and there may be a reduction in the number of accidents, in production relations, in social relations, in man-nature relations, in the relationship between man and his own subjectivity, in a process of collective construction of a new culture, new knowledge.

To estimate specific and differentiated field education as an alternative for the survival of man in the environment, focusing on the object of the process of human formation within the society in which the people of Alto do Juruá, Acre, Brazil, live. Another aspect suggested is the full and complete respect for biodiversity, as this is the product of millions of years of biological evolution and component of our planet's life support system, essential ecosystem processes for maintaining life on Earth.

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Resumo

Introdução: Acidentes com peixes, denominados de ictismo, são comuns e são considerados um problema de saúde negligenciado, de alta morbidade e baixa letalidade. Destacam-se os envenenamentos por arraias de água doce, pois são considerados muito graves e uma das mais importantes lesões causadas por animais aquáticos na América do Sul.

Apresentação do caso: Descrever um acidente e lesão vascular com animais peçonhentos do tipo arraia no alto do Juruá, Acre, Brasil. Paciente do sexo masculino, admitido devido a ferroada de arraia no membro inferior esquerda há 20 dias.

Conclusão: O ferrão da arraia de água doce por possuir características pontiagudas lesionou a veia safena magna, necessitando de uma intervenção cirúrgica. O quadro apresentou evolução negativa devido a não realização de procedimentos necessários no primeiro atendimento, como a limpeza adequada do ferimento e a retirada do ferrão.

Palavras-chave: ictismo, arraias, saúde ocupacional, animais peçonhentos.